

## SECTION 401 – EROSION CONTROL

### 1. GENERAL

Erosion control shall consist of the placement of jute mesh on a smooth uniform soil surface after seeding and fertilizing operations have been completed.

### 2. QUALITY

Jute mesh for erosion control shall be new and unused smolder resistant material. It shall be of uniform, open, plain weave, single Jute yarn. The yarn shall be of loosely twisted construction and shall be reasonably uniform in diameter. Jute mesh shall be furnished in rolled strips having the following dimensions:

Length of roll - - - - - 225 ft. (approximately)

Width of strip - - - - - 45" to 48"

Minimum weight - - - - - 1.05 lb./lin.yd.

### 3. PLACEMENT

**The jute mesh erosion control shall be placed as shown on the plans or as directed by the Engineer.**

After the soil has been properly shaped, seeded and fertilized, the jute mesh shall be placed in complete contact with the soil in all areas. The mesh shall not be stretched. Where more than one strip is required to cover the given area, the strips shall be lapped a minimum of four (4) inches for side laps and a minimum of twelve (12) inches for end laps.

Staples ("U" shaped) shall be eleven (11) gage commercial quality ungalvanized and shall be six (6) inches in length. The staples shall be driven vertically into the soil and spaced 3 feet to 4 feet apart in three (3) rows for each strip, with one row along each edge and one row spaced alternately in the middle. All anchor slots, junction slots, and terminal folds shall have the staples spaced not more than nine (9) inches apart across their width. Approximately 175 staples are required for a 4' x 225' roll of jute.

Anchor slots and terminal folds shall be provided as shown on the plans.

## **MATERIAL SPECIFICATION – P300 (North American Green)**

The permanent erosion control/turf reinforcement mat shall be a machine-produced mat of 100% UV stable polypropylene fiber.

The matting shall be of consistent thickness with synthetic fibers evenly distributed over the entire area of the mat. The blanket shall be covered on the top with black heavyweight UV stabilized polypropylene netting having ultraviolet additives to prevent breakdown and an approximate 0.50 x 0.50 inch (1.27 x 1.27 cm) mesh size. The bottom net shall also be UV stabilized polypropylene, with a 0.625 x 0.625 inch (1.57 x 1.57 cm) mesh size. The blanket shall be sewn together of 1.50 inch (3.81 cm) centers (50 stitches per roll width) with UV stabilized polypropylene thread.

The blanket shall be manufactured with a colored line or thread stitched along both outer edges (approximately 2-5 inches [5-12.5 cm] from the edge) to ensure proper material overlapping.

The erosion control/turf reinforcement mat shall be P300 as manufactured by North American Green, or equivalent. The P300 permanent erosion control/turf reinforcement mat shall have the following properties:

### **Material Content**

Matrix	100% UV Stable Polypropylene Fiber (0.70 lb/yd <sup>2</sup> ) (0.38 kg/m <sup>2</sup> )
Netting	Top side heavyweight UV stabilized (5.0 lbs/1,000 ft <sup>2</sup> [2.44 kg/100 m <sup>2</sup> ] approximate weight) Bottom side heavyweight UV stabilized (3.0 lbs/1,000 ft <sup>2</sup> [1.47 kg/100 m <sup>2</sup> ] approximate weight)
Thread	100% Black Polypropylene

### **Physical Specifications (per roll)**

	<u>English</u>	<u>Metric</u>
Width	6.67 ft	2.03 m
Length	108.00 ft	32.92 m
Weight	56.00 lbs ± 10%	25.38 kg
Area	80 yd <sup>2</sup>	66.80 m <sup>2</sup>
Stitch Spacing	1.50 in	3.81 cm

## SUPPLEMENTAL SPECIFICATION – P300

The North American Green P300 permanent erosion control/turf reinforcement mat shall be constructed of 100% UV stabilized 565 denier polypropylene fiber sewn between a black UV stabilized 0.50 x 0.50 inch (1.27 x 1.27 cm) mesh polypropylene netting on the top (5 lbs/1,000 ft<sup>2</sup>) and a black UV stabilized 0.625 x 0.625 inch (1.59 x 1.59 cm) mesh polypropylene netting on the bottom (3 lbs/1,000 ft<sup>2</sup>). The P300 is sewn together using UV stable polypropylene thread stitched on 1.50 inch (3.81 cm) centers. The mat is highly resistant to ultraviolet and biological degradation. The following list contains further physical properties of the P300 erosion control/turf reinforcement mat:

<u>Property</u>	<u>Test Method</u>	<u>Typical</u>
Thickness	ASTM D5199/ECTC	0.56 in (14.30 mm)
Resiliency	ASTM D1777/ECTC	93.80%
Density	ASTM D792	0.513 oz/in <sup>3</sup> (0.890 g/cm <sup>3</sup> )
Mass per Unit Area	ASTM D3776	13.44 oz/yd <sup>2</sup> (456 g/m <sup>2</sup> )
Porosity	ECTC Guidelines	95.89%
Open Volume per Unit Area	ECTC Guidelines	872 in <sup>3</sup> /yd <sup>2</sup> (11,952 cm <sup>3</sup> /m <sup>2</sup> )
Stiffness	ASTM D1388/ECTC	0.97 oz-in (10,877 mg-cm)
Light Penetration	ECTC Guidelines	12.90%
UV Stability	ASTM D4355**	90%
MD Tensile Strength	ASTM D5035	312 lbs/ft (4.55 kN/m)
MD Elongation	ASTM D5035	14.50%
TD Tensile Strength	ASTM D5035	314 lbs/ft (4.57 kN/m)
TD Elongation	ASTM D5035	16.00%

### Tensile Strength at 10% Elongation

MD Tensile Strength	ASTM D5035	154 lbs/ft (2.25 kN/m)
TD Tensile Strength	ASTM D5035	143 lbs/ft (2.10 kN/m)

### Slope Design Data – Cover Factors (C)

### Channel Design Data

Slope Length (L)	Slope Gradient (S)			Roughness Coefficients		Maximum Permissible Shear Stress	
	≤3:1	3:1 – 2:1	≥2:1	Flow Depth	Mannings's'n'		
≤ 20 ft (6 m)	0.001	0.029	0.082	≤ 0.50 ft (0.15 m)	0.049-0.034	Unvegetated	3.00 lbs/ft <sup>2</sup> (144 Pa)
20 – 50	0.036	0.060	0.096	0.50-2.00 ft	0.034-0.020	Partially Vegetated	5.50 lbs/ft <sup>2</sup> (264 Pa)
≥ 50 ft (15.2 m)	0.070	0.090	0.110	≥ 2.00 ft (0.60m)	0.020	Fully Vegetated	8.00 lbs/ft <sup>2</sup> (383 Pa)

For most accurate design consult ECMDST<sup>™</sup>

Manning's'n' expressed in English units for unvegetated blankets

\*\*ASTM D1682 (4 inch strip) Tensile Strength and % Strength Retention of material following 1000 hrs exposure in Xenon-Arc Weatherometer.

MD – Machine direction  
TD – Transverse direction

## MATERIAL SPECIFICATION – C 350

The composite turf reinforcement mat (C-TRM) shall be a machine produced mat of 100% coconut fiber matrix incorporated into a permanent three-dimensional netting structure.

The matrix shall be evenly distributed across the entire width of the matting and stitch bonded between a heavy duty UV stabilized bottom net with 0.50 x 0.50 inch (1.27 x 1.27 cm) openings, a super heavy duty UV stabilized, dramatically corrugated (crimped) middle netting with 0.50 x 0.50 inch (1.27 x 1.27 cm) openings. The corrugated netting shall form prominent closing spaced ridges across the entire width of the mat. The three nettings shall be stitched together on 1.50 inch (3.81 cm) centers with UV stabilized polypropylene thread to form a permanent three-dimensional structure.

All mats shall be manufactured with a colored thread stitched along both outer edges (approximately 2-5 inches [5-12.5 cm] from the edge) as an overlap guide for adjacent mats.

The composite turf reinforcement mat shall be the North American Green C350, or equivalent. The C350 permanent composite turf reinforcement mat shall have the following physical properties:

### Material Content

Matrix	100% Coconut Fiber (0.50 lb/yd <sup>2</sup> ) (0.27 kg/m <sup>2</sup> )
Netting	Top - Heavy UV Stabilized Polypropylene 8.00 lbs/1,000 ft <sup>2</sup> (3.91 kg/100 m <sup>2</sup> ) approximate weight  Mid - Super heavy UV Stabilized Polypropylene Corrugated 24 lb/1,000 ft <sup>2</sup> (11.7 kg/100 m <sup>2</sup> ) approximate weight  Bottom – Heavy UV Stabilized Polypropylene 8.00 lbs/1,000 ft <sup>2</sup> (3.91 kg/100 m <sup>2</sup> ) approximate weight
Thread	Black UV Stabilized Polypropylene

### Physical Specifications (per roll)

	<u>English</u>	<u>Metric</u>
Width	6.50 ft	2.00 m
Length	55.50 ft	16.90 m
Weight	37.00 lbs ± 10%	16.80 kg
Area	40.00 yd <sup>2</sup>	33.40 m <sup>2</sup>
Stitch Spacing	1.50 in	3.81 cm

## SUPPLEMENTAL SPECIFICATION – C350

The composite turf reinforcement mat (C-TRM) shall be a machine produced mat of 100% coconut fiber matrix incorporated into a permanent three-dimensional netting structure.

The matrix shall be stitch bonded between a heavy duty UV stabilized bottom net with 0.50 x 0.50 inch (1.27 x 1.27 cm) openings, a heavy duty UV stabilized, dramatically corrugated (crimped) intermediate netting with 0.50 x 0.50 (1.27 x 1.27 cm) openings, and a super heavy duty UV stabilized top net with 0.50 x 0.50 (1.27 x 1.27 cm) openings. The corrugated netting shall form prominent closely spaced ridges across the entire width of the mat. The three nettings shall form prominent closely spaced ridges across the entire width of the mat. The three nettings shall be stitched together on 1.50 inch (3.81 cm) centers with UV stabilized polypropylene thread to form a permanent three-dimensional structure.

<u>Property</u>	<u>Test Method</u>	<u>Typical</u>
Thickness	ASTM D5199/ECTC	0.66 in (16.80 mm)
Resiliency	ASTM D1777	90%
Density	ASTM D792	0.51 oz/in <sup>3</sup> (0.890 g/cm <sup>3</sup> )
Mass per Unit Area	ASTM D5261	13.16 oz/yd <sup>2</sup> (446 g/m <sup>2</sup> )
Porosity	ECTC Guidelines	97.05%
Open Volume per Unit Area	ECTC Guidelines	840 in <sup>3</sup> /yd <sup>2</sup> (16,402 cm <sup>3</sup> /m <sup>2</sup> )
Stiffness	ASTM D1388/ECTC	3.83 oz-in (42,710 mg-cm)
Light Penetration	ECTC Guidelines	5.50%
MD Tensile Strength	ASTM D5035	658lbs/ft (9.60 kN/m)
MD Elongation	ASTM D5035	13.40%
TD Tensile Strength	ASTM D5035	910 lbs/ft (13.28 kN/m)
TD Elongation	ASTM D5035	10.90%

### Tensile Strength at 10% Elongation

MD Tensile Strength	ASTM D5035	355 lbs/ft (4.89kN/m)
TD Tensile Strength	ASTM D5035	596 lbs/ft (8.69 kN/m)

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### C350 PERMANENT NET STRUCTURE ONLY

<u>Property</u>	<u>Test Method</u>	<u>Typical</u>
Thickness	ASTM D5199/ECTC	0.56 in (14.20 mm)
UV Stability	ASTM D4355**	86%
MD Tensile Strength	ASTM D5035	528 lbs/ft (7.70 kN/m)
MD Elongation	ASTM D5035	28%
TD Tensile Strength	ASTM D5035	837 lbs/ft (12.21 kN/m)
TD Elongation	ASTM D5035	12%

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\*\*ASTM D1628 (4 inch strip) Tensile Strength and % Strength Retention of material following 1000 hrs exposure in Xenon-Arc Weatherometer.

MD-Machine direction      TD - Transverse direction